PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Navarro Mills Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Navarro Mills Reservoir were surveyed in 2012 using electrofishing and trap netting and in 2013 using gill netting. Historical data are presented with the 2012-2013 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Navarro Mills Reservoir is a 4,336-acre impoundment on Richland Creek, a tributary of the Trinity River. It was constructed by the U.S. Army Corps of Engineers (USACE) in 1963 to provide flood control and water for municipal and industrial purposes. Boat and bank angler access are excellent. Handicap-specific facilities are present in the parking lot and restrooms near three of the boat ramps. Water is turbid but is high in productivity; mean TSI *chl-a* is 52.9 (Texas Commission on Environmental Quality 2011), therefore classified as eutrophic. Land use surrounding the reservoir is primarily agricultural (row cropping) and contributes to high turbidity and siltation. Navarro Mills Lake is operated by USACE; therefore, there is no residential shoreline development and angler access is excellent.

- **Management History:** Important sport fish include Largemouth Bass, Blue and Channel Catfish, White Bass, and White Crappie. No stocking has been conducted at Navarro Mills Reservoir since the last survey report. Fish community surveys are conducted every four years. Statewide harvest regulations are in effect for all species.

- **Fish Community:**
  - **Prey species:** The prey community is dominated by Threadfin and Gizzard Shad. Although several sunfish species are present, their low abundance and poor size distribution limit angling opportunity.

  - **Catfishes:** Although Channel Catfish are still present, their abundance has decreased and Blue Catfish now dominate the catfish community. Size distribution and body condition of Blue Catfish is good and they provide excellent angling opportunity.

  - **White Bass:** White Bass abundance has increased compared to previous years and is likely related to inflows in spring 2012. Angling opportunity is very good.

  - **Black basses:** Relative abundance of Largemouth Bass continued to be low and size distribution was poor. Population dynamics of Largemouth Bass are likely limited by high turbidity, extreme water level fluctuation, and a commensurate lack of submerged aquatic vegetation.

  - **Crappie:** Relative abundance of crappie continued to be high but size distribution was dominated by fish below legal length. Crappie growth is moderate and condition of adult fish is very good.

- **Management strategies:** Conduct electrofishing, trap netting, and angler access and aquatic vegetation surveys in 2016, and gill netting in 2017. Continue soliciting assistance from interested angler groups in constructing and placing artificial structures as fish attractors. Maintain communication with USACE regarding the threat of invasive species, particularly zebra mussels.

INTRODUCTION

This document is a summary of fisheries data collected from Navarro Mills Reservoir from June 2012 through May 2013. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2012-2013 data for comparison.

Reservoir Description

Navarro Mills Reservoir is a 4,336-acre impoundment on Richland Creek, a tributary of the Trinity River. It was constructed by the U.S. Army Corps of Engineers (USACE) in 1963 to provide flood control and water for municipal and industrial purposes. Angler access is excellent; handicap-specific facilities are present in the parking lot and restrooms near three of the four boat ramps. Water is turbid and eutrophic with a mean TSI *chl-a* of 52.9 (Texas Commission on Environmental Quality 2011). Land use surrounding the reservoir is primarily agricultural [cotton *(Gossypium hirsutum)* and sorghum *(Sorghum bicolor)* row cropping] and contributes to high turbidity and accelerated siltation. The habitat types within the littoral zone are not particularly diverse (Table 4) and aquatic vegetation is scarce. The majority of the shoreline is eroded bank (58%), with small areas of rocky shoreline (5%) or riprap (<1%). Because Navarro Mills Reservoir is operated by USACE, no residential shoreline development exists. Other descriptive characteristics for Navarro Mills Reservoir are found in Table 1.

Angler Access

Navarro Mills Reservoir has five access areas with seven public boat ramps. A marina is present at Liberty Hill Park and offers boat storage, bait, and snacks. The ramps at Oak Park, Wolf Creek, Brushy Prairie, and Liberty Hill were all accessible at the time of the survey but only Liberty Hill #2 would have been usable in fall 2011 when water level was at 421 MSL (Figure 1). Additional boat ramp characteristics are presented in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Bennett 2009) included:

1. Promote developing Blue Catfish *(Ictalurus furcatus)* fishery through angler outreach and document continued development of the population through standard gill net sampling in spring 2013.
   Action: Park staff was notified of the developing fishery and have assisted in providing information to anglers through park hosts. Operators of the marina maintain a web site promoting the fishery (Navarro Mills Lake Marina 2013). Spring 2013 gill net sampling was conducted as scheduled.
2. Document dynamics of the White Bass *(Morone chrysops)* population through standard gill net sampling in spring 2013.
   Action: Spring 2013 gill net sampling was conducted as scheduled.
3. Consult with USACE staff about constructing artificial structures and solicit assistance of local angling groups in implementing plan.
   Action: USACE staff was contacted but did not appear interested in the project.
4. Consult with USACE staff regarding monitoring changes in hydrilla coverage and possibility of giant salvinia *(Salvinia Molesta)* and other invasive species infestation.
   Action: Staff continued to monitor for hydrilla but none was detected. Staff was also advised to monitor for zebra mussels (*Dreissena polymorpha*).

Harvest regulation history: All sport fishes in Navarro Mills Reservoir have been managed with statewide harvest regulations (Table 3) with no changes since the last survey (Ott and Bennett 2009).

Stocking history: No stocking has been conducted at Navarro Mills Reservoir since the last survey (Ott and Bennett 2009). A complete stocking history is presented in Table 4.

Vegetation/habitat management history: Due to high turbidity and fluctuating water level, aquatic vegetation has historically been scarce on Navarro Mills Lake, occupying less than 2% of the reservoir area in 2008 (Ott and Bennett 2009). Hydrilla was discovered in 2000 at the Liberty Hill Park area and covered approximately 0.5 acres in 2004 (Ott and Bister 2005) but only a trace amount was identified in the 2008 survey. The controlling authority was notified of the potential problems associated with hydrilla infestation but no action has been necessary.

Water transfer: Navarro Mills Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. One permanent pumping station on the reservoir is operated by the City of Corsicana Water Supply for use as municipal water. The City of Dawson previously maintained a pump station and pipeline but this facility has been taken off line and the pumps removed. No other interbasin transfers are known to exist.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad *(Dorsoma cepedianum)*, (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics. Ages were determined using otoliths from 13 White Crappie *(Pomoxis annularis),* ranging in length from 9.1 to 10.9 inches.

Source for water level data was the United States Geological Survey (USGS 2013).

RESULTS AND DISCUSSION

Habitat: Littoral habitat is classified as primarily eroded shoreline and overhanging terrestrial vegetation (58% and 37%, respectively) (Table 5). Approximately 5% (1.2 miles) of the shoreline consists of riprap present along the dam. Due to extensive siltation from the watershed, the upper third of the reservoir is shallow and inaccessible.

Turbidity limits light penetration and seasonal fluctuations in water level limit persistence of submerged aquatic vegetation. American pondweed *(Potamogeton nodosus)* was the only submersed species identified during the August 2012 vegetation survey and aerial coverage was less than 1 acre (Table 6). Emergent species are more tolerant of turbidity and water level fluctuation. However, even the emergent species community continues to be poorly developed. Giant bulrush (*Schoenoplectus californicus)* and waterwillow *(Justicia Americana)* were present, but overall coverage was approximately 15 acres and in the same areas where it was identified in 2008.

Prey species: The prey base is dominated by clupeids (shad). Both Threadfin Shad (*D. petenense)* and Gizzard Shad electrofishing catch rates were high (369/h and 443/h, respectively), (Appendix A). Catch of Gizzard Shad increased from 2008 (275/h) and 2004 (113/h) (Figure 2). Furthermore, Index of Vulnerability (IOV) was 95, indicating most were available as prey. Electrofishing catch rate of Threadfin Shad was also substantially higher than in 2008 (131/h).

Sunfish abundance is far lower than clupeids and their contribution to the prey base is likely minimal. Longear Sunfish *(Lepomis megalotus)* was the most abundant species with an electrofishing catch rate of 90/h, followed by Bluegill *(L. macrochirus)* (32/h) and Redear Sunfish *(L. microlophus)* (2/h) (Appendix A). Low abundance of sunfishes is likely related to high turbidity and low overall coverage of aquatic vegetation. Due to their poor size distribution (Figures 3&4), it is unlikely that sunfishes support a sport fishery.

Catfish: Navarro Mills Reservoir supports populations of both Blue Catfish and Channel Catfish *(I. punctatus)*, and Channel Catfish were traditionally the dominant species. Ott and Bennett (2009) predicted that species dominance would shift as inundated timber continued to decompose and attachment areas for benthic organisms declined; this has been the case. Gill net catch rate of Blue Catfish in 2013 (8.4/nn) was nearly double that of 2009 (4.4/nn), and size distribution suggested strong recruitment (Figure 5). The strong initial year class (represented by sub-adults in the 19- to 22-inch range in 2009) has continued to grow and individuals as long as 38 inches were collected. Body condition was moderately high, with W_r of most size classes $\geq$95, indicating adequate prey availability.

As previously noted, Channel Catfish abundance has declined relative to Blue Catfish (Appendix 1). Gill net catch rate in 2013 (2.2/nn) is far below the 9.6/nn in 2009 or 10.0/nn in 2005 (Figure 6). Declines in recruitment and in abundance of harvestable-length fish were apparent. Body condition for all but the largest size classes were low ($W_r < 90$) and suggests limited availability of benthic food organisms. As Channel Catfish grow and their diet shifts to fish their W_r improve.

White Bass: White Bass have traditionally provided a popular fishery, but gill net catch rates have been variable (Figure 7). In 2013, gill net catch rate (6.6/nn) was higher than 2009 (1.8/nn) and was similar to 2005 (5.2/nn). Year-class strength is related to inflow during the spawning season (DiCenzo and Duval 2002), and flood conditions in spring 2012 (Figure 1) likely resulted in the higher observed catch rate. Specimens collected in the 2013 sample ranged from 7-16 inches in length and size structure (PSD_p=76) indicated high relative abundance of legal-length ($\geq$10 inch) individuals. Body condition of fish in 2013 was good ($W_r \geq 100$) for most inch classes, indicating adequate forage availability.

Largemouth Bass: Electrofishing catch rate of Largemouth Bass *(Micropterus salmoides)* in 2012 (40/h) was lower than 2008 (74/h) but double that of 2004 (17/h) (Figure 8). Catch rate of sub-stock-size ($\leq$8 inches) Largemouth Bass was higher than either of the previous two surveys and is likely the result of flood conditions in spring and early summer 2012. If this year-class persists, it should contribute to the fishery by 2014. Proportional Stock Density (PSD) was similar to 2008 and improved over 2004, but overall abundance of legal-length fish ($\geq$14 inches) continued to be poor. Despite poor size distribution, body condition has improved substantially compared to that observed in 2004. Relative weight (W_r) was $\geq$100 for most size classes larger than stock-size. Growth assessment was not conducted in 2012 due to insufficient collection of fish in the appropriate size range. However, Ott and Bennett (2009) determined mean age for Largemouth Bass at 14 inches (13.1-14.8 inches) was 1.2 years (N =13, range 1-2 years). Low overall abundance and poor population dynamics of Largemouth Bass are likely due to a combination of high turbidity and low abundance of aquatic vegetation.

Crappie: White Crappie relative abundance continued to be high in 2012 with a trap net catch rate of 37.6/nn (Figure 9). Evidence of a strong 2012 year-class (represented by 2- and 3-inch individuals) is likely related to flood conditions in spring and summer 2012 (Figure 1). A similar strong year-class produced in 2007 was reported by Ott and Bennett (2008) and was also related to hydrology. However, catch rate of stock size crappie was only half that of the previous two surveys. Therefore, it appears year-class strength is inconsistent and related to flood pulses and inundation of terrestrial vegetation. Growth

rate was somewhat slower than reported in 2008 (Ott and Bennett 2007), but is still adequate. Mean age at 10 inches (9.1-11.0) was 1.6 years (N =13, range 1-2 years). Therefore, it appears that the 2012 year-class will be available to harvest by anglers by 2013 or 2014. Body condition was low (W_r <90) for 5- to 7-inch individuals, but was $\geq$100 for larger fish. This suggests intra-specific competition for invertebrate prey items is high, but once they grow to a size where their diet shifts to fish, their condition improves.

Fisheries management plan for Navarro Mills Reservoir, Texas

Prepared – July 2013

ISSUE 1: Blue Catfish have become the dominant catfish species at Navarro Mills Reservoir. Relative abundance has continued to increase and size distribution provides the potential for a trophy fishery.

MANAGEMENT STRATEGIES

1. Continue monitoring the Blue Catfish population through standard gill net sampling in spring 2017.
2. Continue promoting the fishery through local outdoor media and by conducting outreach presentations to area angling groups as requested.

ISSUE 2: The row cropping of sorghum and cotton in the watershed result in high levels of soil erosion and contribute to high turbidity. Because turbidity limits penetration of sunlight, the aquatic vegetation community is limited to a narrow fringe in shallow water. These shallow areas are seasonally exposed due to water level fluctuation so only emergent species such as waterwillow and giant bulrush (which which are resistant to exposure) can survive. Although these species persist, they do not appear to be expanding.

MANAGEMENT STRATEGIES

1. Consult with the USACE staff about the possibility of placing artificial structures in the reservoir; use local contacts developed by USACE staff. Solicit assistance from angler groups in construction of artificial structures.
2. Consult with USACE, Natural Resources Conservation Commission, and Texas AgriLife extension about strategies to manage watershed issues with the hopes of improving water quality.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Invasive vegetation species such as giant salvinia (*Salvinia molesta*) can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and inter-basin transfer of water is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Coordinate with USACE to post appropriate signage at access points around the reservoir.
2. Contact and educate local outdoor oriented businesses about invasive species, and provide posters, literature, etc., so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Conduct standard vegetation survey during late summer 2017.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes electrofishing, trap netting, and angler access and aquatic vegetation surveys in 2016 and gill netting in 2017 (Table 8).

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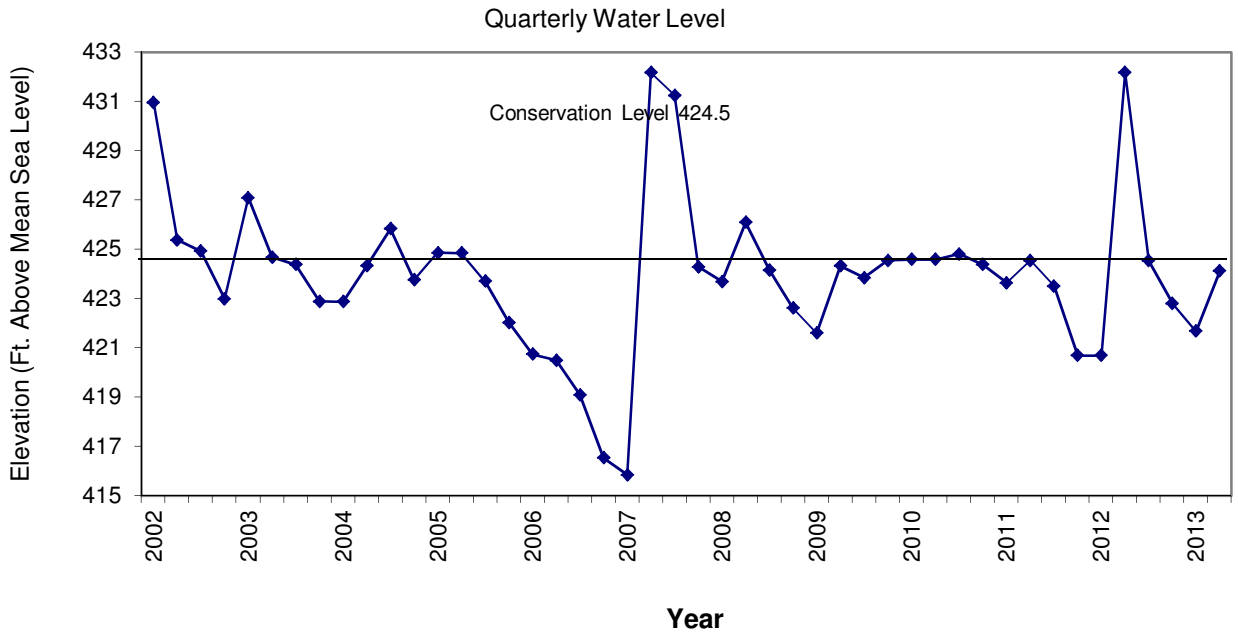


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Navarro Mills Reservoir, Texas. Horizontal line represents conservation level. Data were provided by the United States Geological Survey.

Table 1. Characteristics of Navarro Mills Reservoir, Texas.

Characteristic	Description
Year completed	1963
Controlling authority	U.S. Army Corps of Engineers
County	Navarro
Reservoir type	Flood control
Shoreline Development Index (SDI)	3.8
Conductivity	365 umhos/cm

Table 2. Boat ramp characteristics for Navarro Mills Reservoir, Texas, February, 2013. Reservoir elevation at time of survey was 424.5 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Oak Park	31.96602 -96.69666	Y	25	422	Accessible
Wolf Creek	31.96867 -96.72806	Y	25	421	Accessible
Brushy Prairie	31.96850 -96.73198	Y	25	421	Accessible
	31.96300 -96.73775	Y	25	421	Accessible
Pecan Point Park	31.96850 -96.73198	Y	20	424	Out of water. Extension is not feasible
Liberty Hill 1	31.94602 -96.71028	Y	24	421	Accessible
Liberty Hill 2	31.95146 -96.72025	Y	20	419	Excellent

Table 3. Harvest regulations for Navarro Mills Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Navarro Mills Reservoir, Texas. FGL = fingerling; UNK = unknown.

Species	Year	Number	Size
Channel Catfish	1984	50,600	FGL
	1985	9,680	FGL
	1986	111,094	FGL
Flathead Catfish	1968	500	UNK
		500	
Striped Bass	1967	400,000	FRY
	1968	176,500	FRY
	1969	31,900	FGL
	1970	32,800	FGL
	1971	21,000	FGL
		662,280	
Palmetto Bass	1975	51,748	UNK
	1979	52,750	UNK
	1982	50,945	UNK
	1984	127,252	FGL
	1986	75,050	FGL
	1991	76,468	FGL
	1992	41,240	FGL
	1994	77,400	FGL
	1995	107,415	FGL
	1996	77,845	FGL
	1997	76,569	FGL
	1998	82,546	FGL
		897,228	
Florida Largemouth Bass	1976	266,000	FGL
	1990	232,037	FRY
	1990	17,482	FGL
	1995	253,996	FGL
	1998	49,973	FGL
	2002	218,491	FGL
	2003	218,684	FGL
		1,256,663	

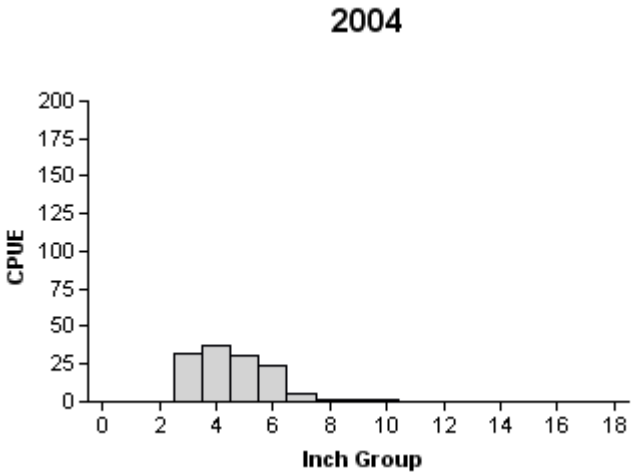
Table 5. Survey of structural habitat types, Navarro Mills Reservoir, Texas, 2012. Shoreline habitat type units are in miles.

Habitat type	Estimate	% of total
Eroded shoreline	14.4 miles	58
Riprap	1.2 miles	5
Vegetated shoreline	9.3 miles	37

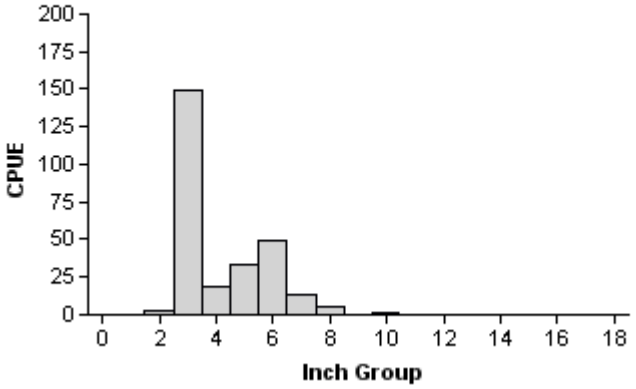
Table 6. Survey of aquatic vegetation, Navarro Mills Reservoir, Texas, 2008 and 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2008	2012
Native submersed		
American pondweed	-.-	<1.0 (<0.1)
Native emergent		
Giant bulrush	4.8 (0.1)	5.0 (0.1)
Water willow	10.6 (0.2)	10.0 (0.2)
Non-native		
Hydrilla	<0.1 (<0.1)	-.-

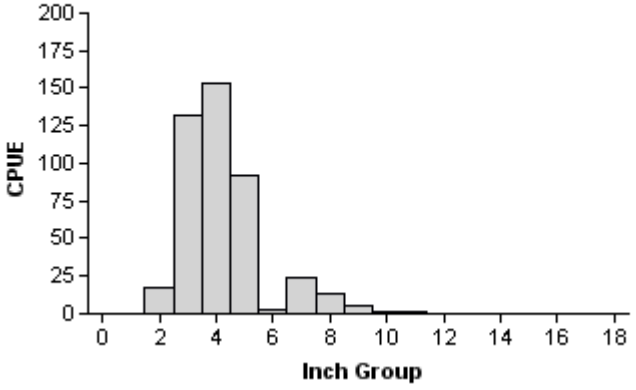
Gizzard Shad



Effort = 1.0
Total CPUE = 133.0 (15; 133)
Stock CPUE = 8.0 (50; 8)
IOV = 98 (1.2)



Effort = 1.0
Total CPUE = 275.0 (28; 275)
Stock CPUE = 19.0 (31; 19)
IOV = 98 (0.7)



Effort = 1.0
Total CPUE = 443.0 (34; 443)
Stock CPUE = 45.0 (41; 45)
IOV = 95 (1.9)

Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Navarro Mills Reservoir, Texas, 2004, 2008, and 2012.

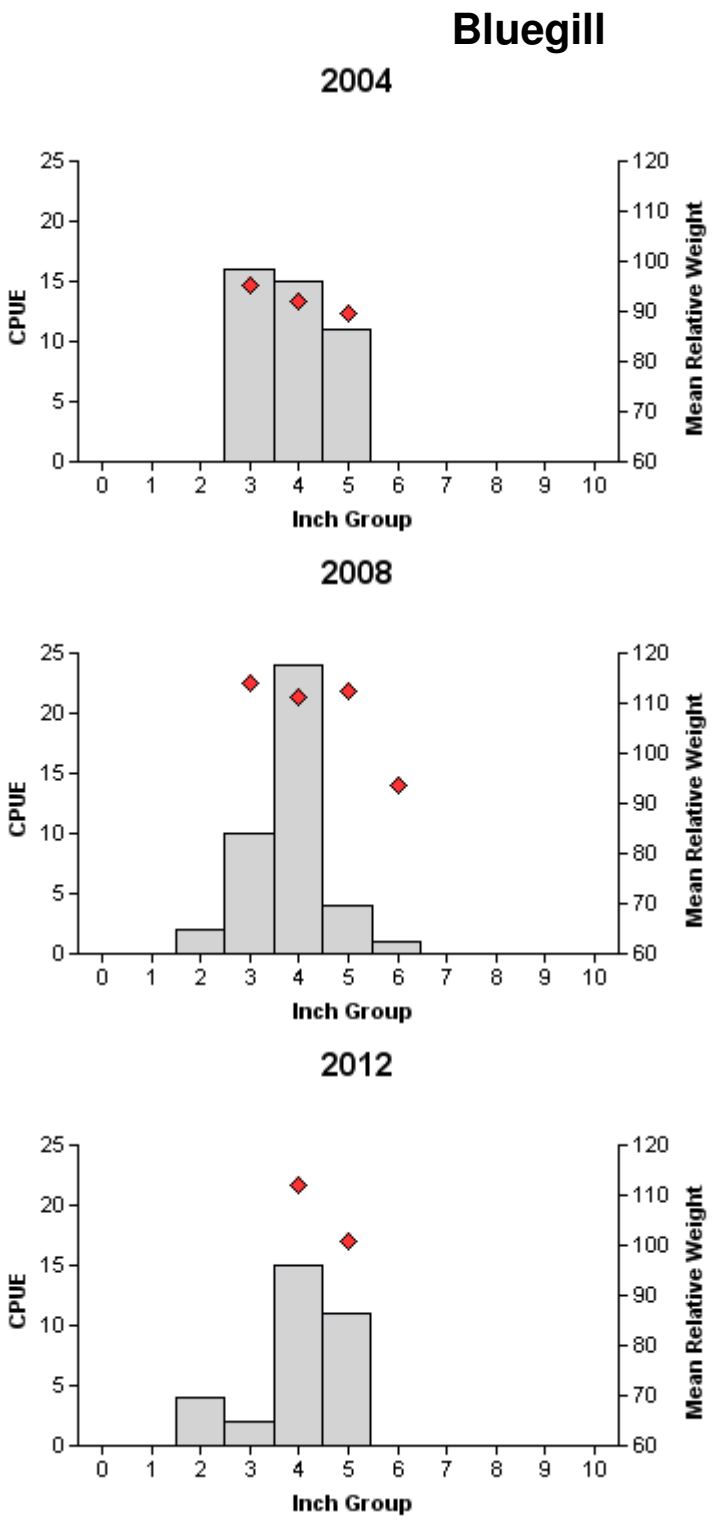
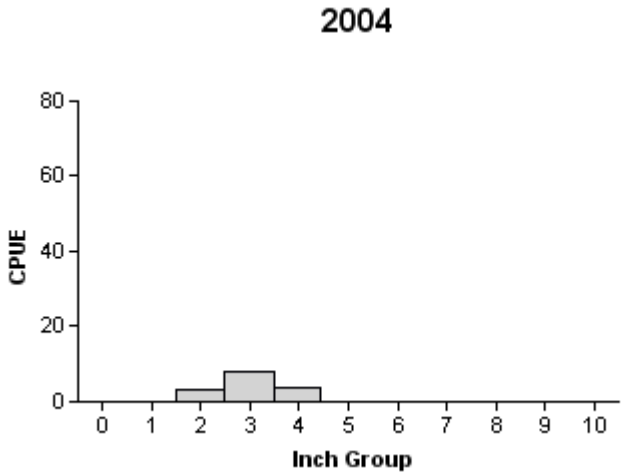
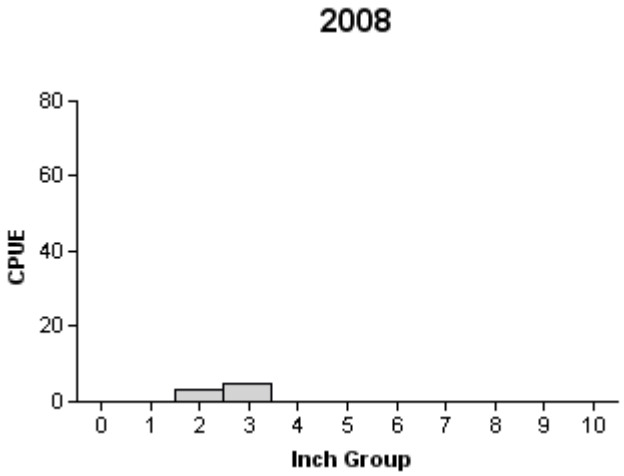


Figure 3. Number of Bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Navarro Mills Reservoir, Texas, 2004, 2008, and 2012.

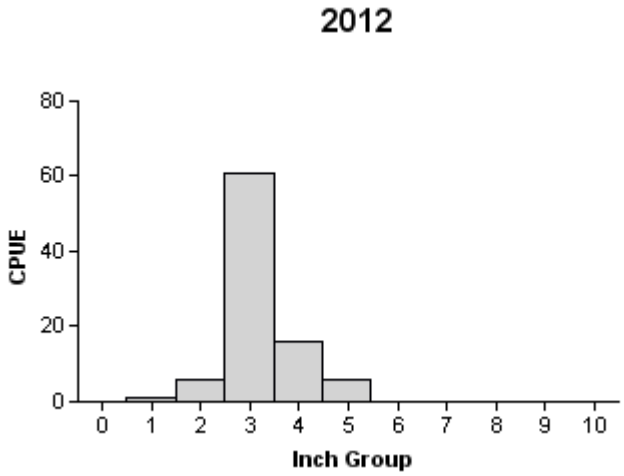
Longear Sunfish



Effort = 1.0
Total CPUE = 15.0 (56; 15)
Stock CPUE = 15.0 (56; 15)



Effort = 1.0
Total CPUE = 8.0 (34; 8)
Stock CPUE = 8.0 (34; 8)



Effort = 1.0
Total CPUE = 90.0 (53; 90)
Stock CPUE = 90.0 (53; 90)

Figure 4. Number of Longear Sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Navarro Mills Reservoir, Texas, 2004, 2008, and 2012.

Blue Catfish

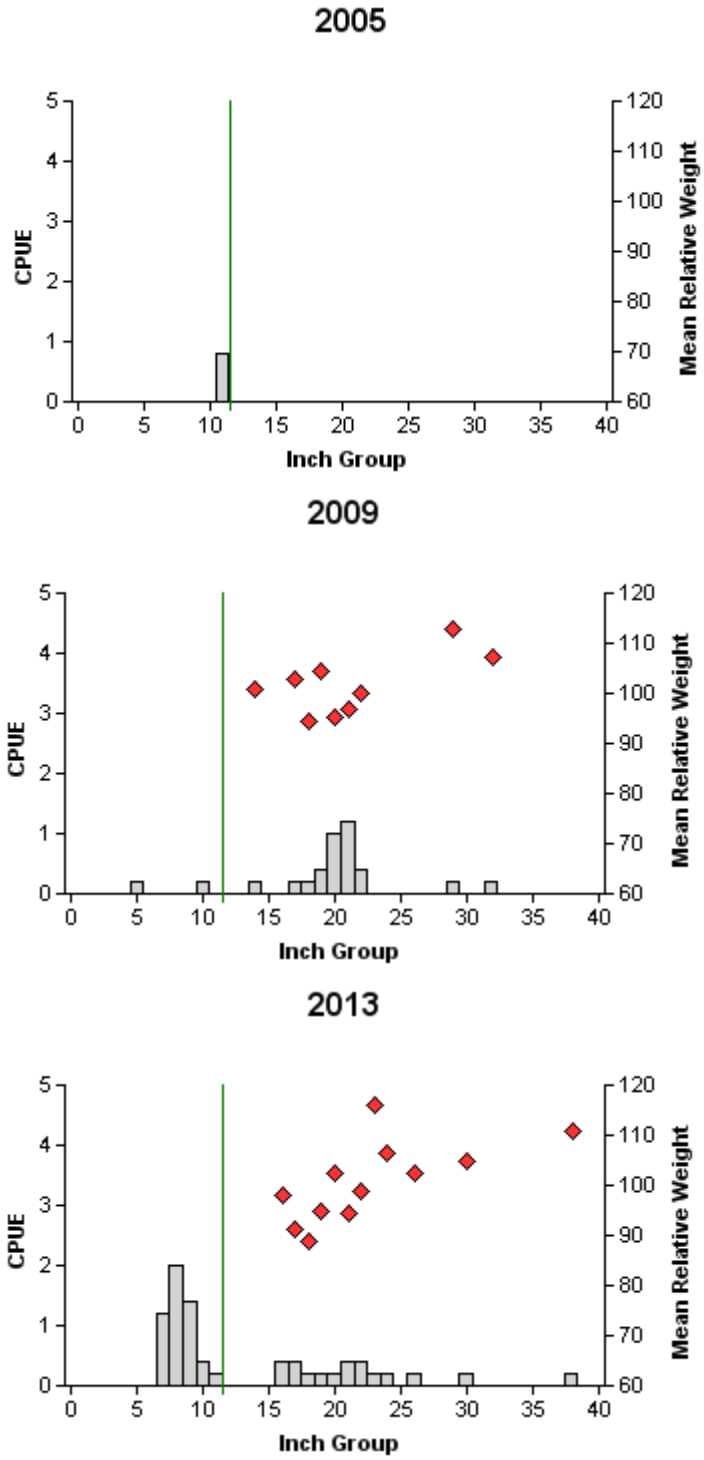
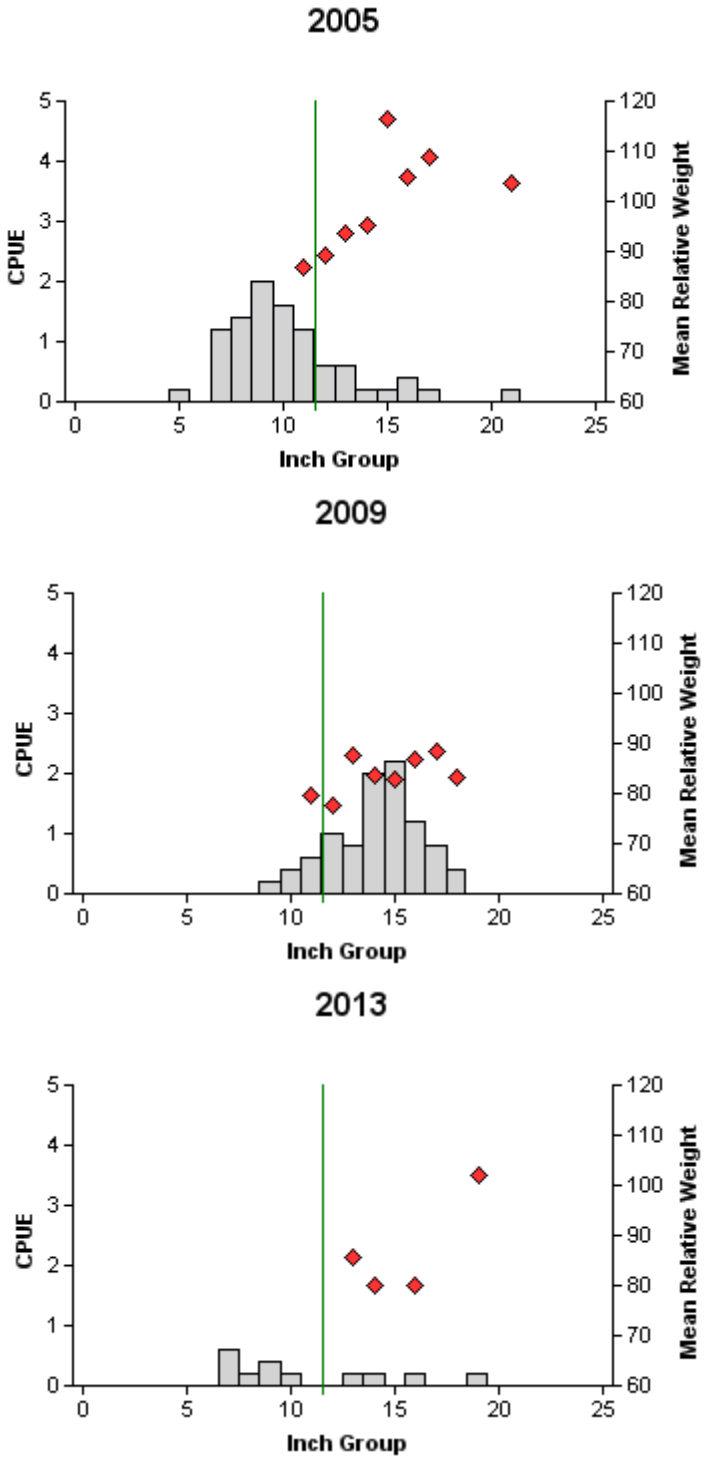


Figure 5. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Navarro Mills Reservoir, Texas, 2005, 2009, and 2013. Vertical line represents length limit at time of survey.

Channel Catfish



2005
Effort = 5.0
Total CPUE = 10.0 (36; 50)
Stock CPUE = 3.6 (34; 18)
PSD = 22 (7.1)
PSD-12 = 67 (12.1)

2009
Effort = 5.0
Total CPUE = 9.6 (35; 48)
Stock CPUE = 9.0 (34; 45)
PSD = 27 (6.1)
PSD-12 = 93 (0.9)

2013
Effort = 5.0
Total CPUE = 2.2 (44; 11)
Stock CPUE = 0.8 (47; 4)
PSD = 50 (34.2)
PSD-12 = 100 (0)

Figure 6. Number of Channel Catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for spring gill net surveys, Navarro Mills Reservoir, Texas, 2005, 2009, and 2013. Vertical line represents length limit at time of survey.

White Bass

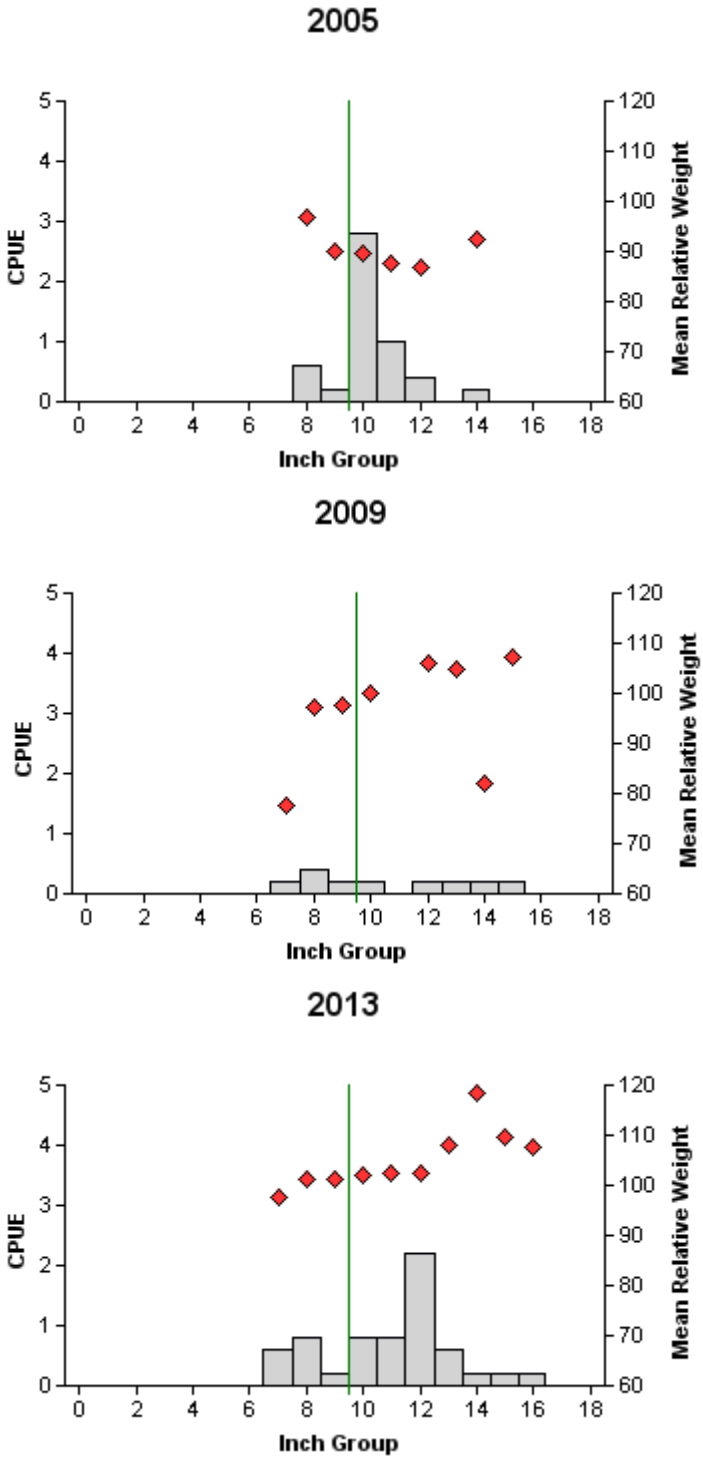


Figure 7. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for spring gill net surveys, Navarro Mills Reservoir, Texas, 2005, 2009, and 2013. Vertical line represents length limit at time of survey.

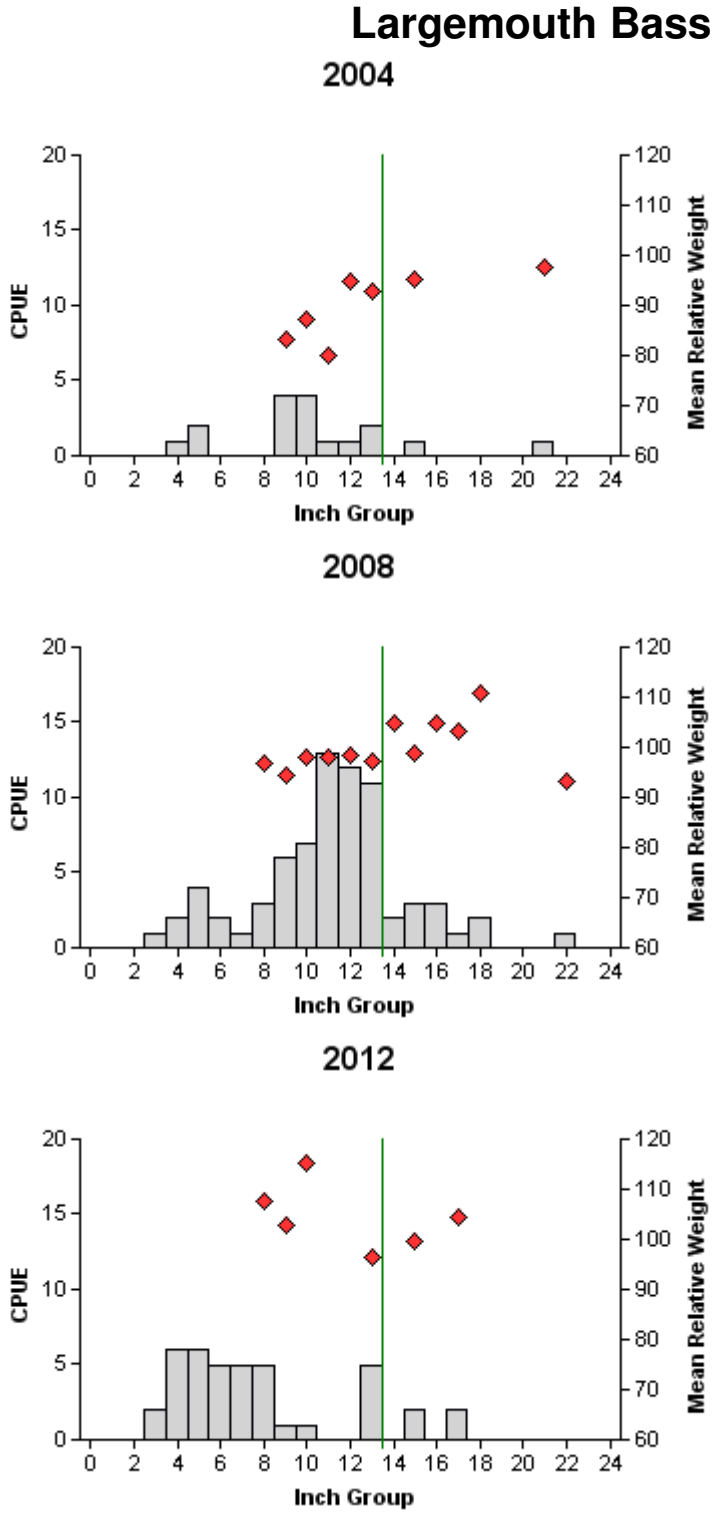


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Navarro Mills Reservoir, Texas, 2004, 2008, and 2012. Vertical line represents length limit.

Largemouth Bass

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Navarro Mills Reservoir, Texas, 1997, 2000, and 2008. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
1987	28	0	5	23	10	0
1994	30	0	8	22	15	0
1997	14	1	6	7	29	7
2000	30	4	16	10	40	13
2008	29	1	28	0	59	3

White Crappie

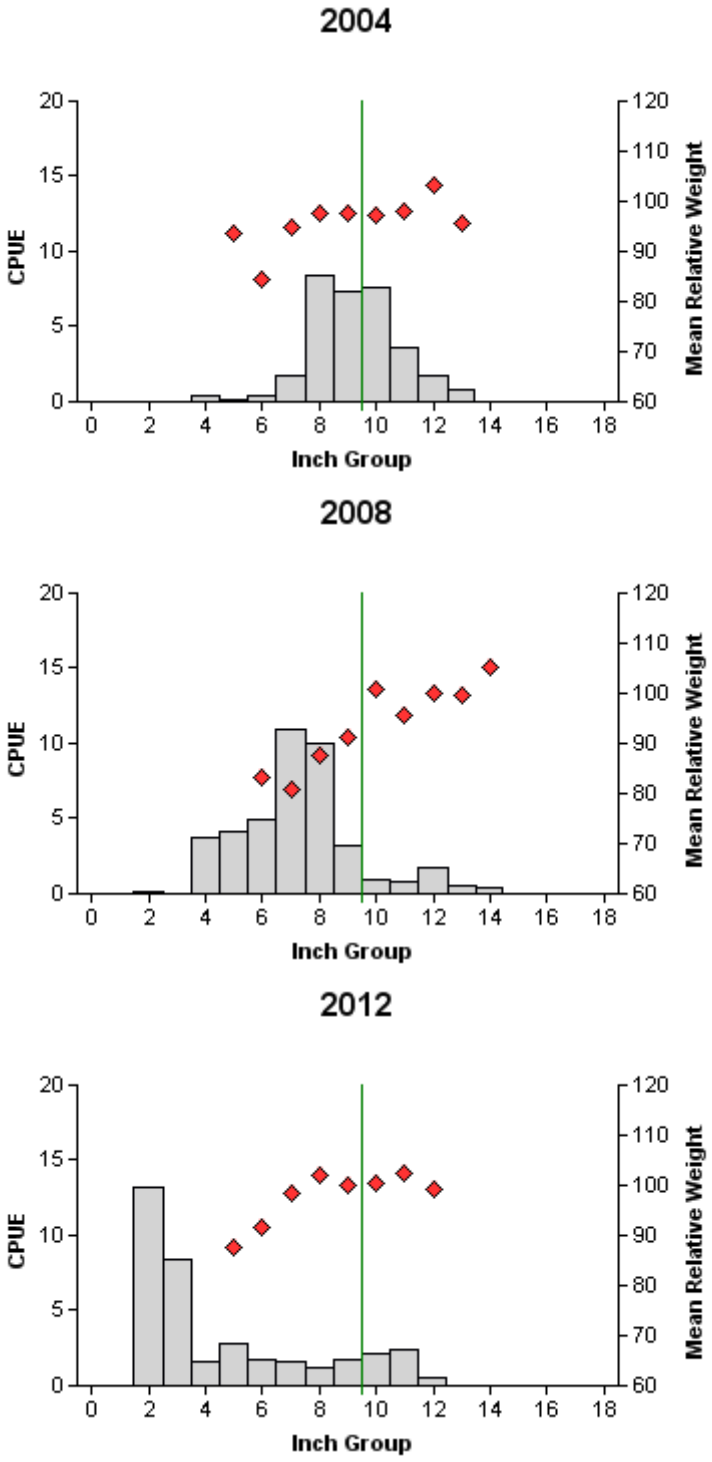


Figure 9. Number of White Crappie caught per net night (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Navarro Mills Reservoir, Texas, 2004, 2008, and 2012. Vertical lines represent length limit at time of survey.

Table 8. Proposed sampling schedule for Navarro Mills Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A

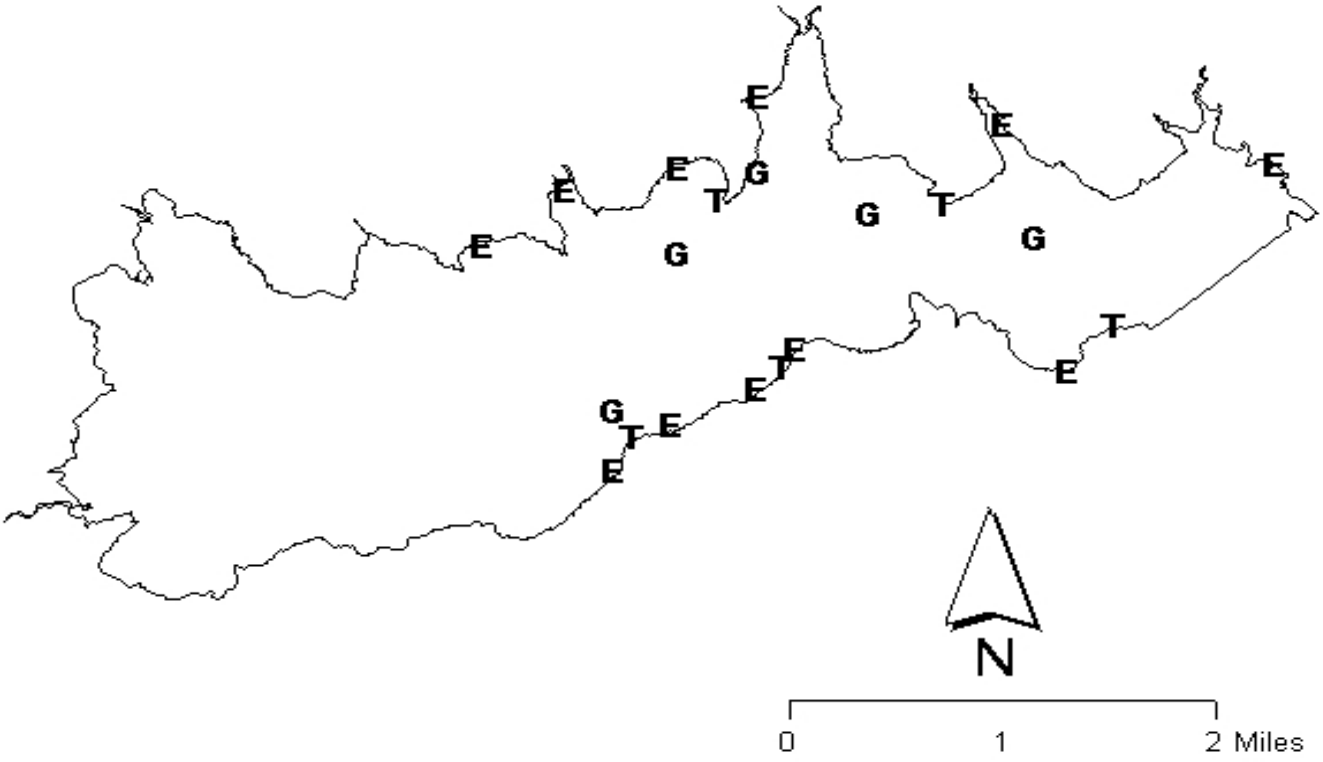
Survey year	Electrofish Fall	Trap net	Gill net	Habitat		Access	Report
				Structural	Vegetation		
2013-2014							
2014-2015							
2015-2016							
2016-2017	S	A	S		S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Navarro Mills Reservoir, Texas, 2012-2013. Sampling effort was 5 net nights for gill netting, 5 net nights for trap netting, and 1 hour for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					443	443.0
Threadfin Shad					369	369.0
Blue Catfish	42	8.4				
Channel Catfish	11	2.2				
White Bass	33	6.6			1	1.0
Green Sunfish						
Bluegill						
Longear Sunfish					90	90.0
Redear Sunfish					2	2.0
Largemouth Bass					40	40.0
White Crappie			188	37.6		

APPENDIX B



Location of sampling sites, Navarro Mills Reservoir, Texas, 2012-2013. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.